Model DB-4048 is designed for use with duplex stations operating with close frequency spacing in the 146-174 MHz band. This duplexer includes the use of quarter-wave coaxial cavities interconnected in a band-reject configuration with double shielded coaxial cable. Frequency stability over a wide temperature range is achieved by use of a threaded laver rod to control the length of the center conductor in each cavity. It is designed to handle transmitter power up to 400 watts. A sturdy steel cabinet is included.

The DB-4048 is a 6-cavity duplexer with three cavities in the transmitter section, three in the receiver section. It is generally suitable for use with most tube type and many solid state type stations when the separation between transmit and receive frequencies is 0.5 MHz or more. Under certain conditions, it is also suitable for coupling two transmitters, two receivers or two simplex stations into a common antenna when the two frequencies involved are separated by more than 0.5 MHz.

The duplexer response curves on the back illustrate the typical isolation provided by the duplexer when operated at minimum frequency separation. Another curve shows the transmitter and receiver insertion loss versus frequency separation. At greater separation between transmit and receive frequencies, the rejection remains the same but the transmitter and receiver losses are less.

In any duplex system, it is important that the duplexer and other components provide and maintain a high degree of isolation between the transmitter and receiver in order to prevent degraded receiver performance. Isolation becomes even more critical at close frequency spacing. Accordingly, it is mandatory that double shielded coaxial cable (or solid outer conductor cable) be used to interconnect this duplexer to the transmitter and receiver chasais. Double shielded cable will minimize the coupling of RF energy between the interconnecting cables. A suitable duplexer interconnecting cable kit (No. 11521) is available as an optional item.

The duplexer is factory tuned to the exact operating frequencies and shipped ready for immediate installation. No further field tuning or adjustment is normally required.

A Hoffman model A-30-24-16LP weather proof outdoor cabinet is offered as an option.
The block diagram illustrates the use of a DB-4048 close spacing duplexer in a duplex system with a separation of only 500 KHz between transmit and receive frequencies.

**TRANSMIT OPERATION**
The transmitter section of the duplexer consists of three quarter-wave cavities and a harness and is adjusted to pass the transmitter carrier signal to the antenna with low insertion loss while rejecting that part of the transmitter carrier which occurs at the receive frequency.

**RECEIVE OPERATION**
The receiver section of the duplexer also consists of three quarter-wave cavities and a harness and is adjusted to pass the received signal from the antenna to the receiver with low insertion loss while rejecting the transmitter carrier which would otherwise pass through the relatively broad receiver frontend to desensitize and/or cause intermodulation interference.

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>DB-4048</th>
<th>Duplexer</th>
<th>Exact frequency of the transmitter and the receiver must be specified</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB-4048 W/DB 606B</td>
<td>Duplexer W/Hoffman #A-30-24-16LP weather proof outdoor cabinet</td>
<td></td>
</tr>
</tbody>
</table>

**ELECTRICAL DATA**

- **Frequency range**: 146-174 MHz
- **Frequency separation**: 0.5 MHz or more
- **Maximum power input (continuous duty)**: 400 watts
- **Insertion loss—transmitter to antenna** at 0.5 MHz separation: 1.5 dB
- **Insertion loss—receiver to antenna** at 0.5 MHz separation: 1.5 dB
- **Transmitter noise suppression** at the receive frequency: 80 dB
- **Receiver isolation at transmit frequency**: 80 dB
- **Maximum VSWR (referenced to 50 ohms)**: 1.5 to 1
- **Temperature range**: -30°C to +60°C
- **Number of cavity filters**: 6

**MECHANICAL DATA**

- **Cabinet dimensions**:
  - Height: 30"
  - Width: 19 1/4"
  - Depth: 14"
- **Connector terminations**: UHF Female
- **Finish**: Beige vinyl enamel
- **Net weight**: 95 lbs
- **Shipping weight**: 120 lbs.
DB4048 HAM VERSION 2-METER DUPLEXER

OVERVIEW: The Amateur radio version DB4048 consists of new critical length cables (nine) and possibly new loops (six). There is no transmit or receive side - there is only a high frequency and low frequency side of the ham duplexer. The duplexer is a all notch type. There are no bandpass cavities. This means that the duplexer only looks out after itself. It is not good for a crowded site.

Part 1: CABLE MODIFICATION- Cut nine RG214 doubly shielded cables to exactly 12.5 inches and then put on the UHF connectors. The cables lengths are based on the coax having a velocity factor of 66 per cent.

Part 2: LOOP MODIFICATION- The loop is the antenna like device which is part of the connector and extends inside each cavity. Remove each loop (3 screws) and check it length according to the loop spec drawing. The ham duplexer needs three short loops (about 1 inch) on the low frequency side and three long loops (about 1.5 inches) on the high frequency side. You have the information to make the loops yourself.

Part 3: CHECK CAVITIES- It is a good idea to check each cavity for its ability to notch the TX or RX frequency - depending on where it is to be used. All the cavities on the TX side of the duplexer notch the RX frequency. And, all of the cavities on the RX side of the duplexer notch the TX frequency. The cavities should tune smoothly and each cavity should notch by -20dB. If at all possible, check each cavity under power. Cavities may tune great using a signal generator but degrade under 100 watts. In case of problems with the cavities consider the following:

1. Drill out the three rivets around the top side of the cavity.
2. Clean the center silver plated rods.
   a. remove any cleaner used
   b. scrub using Scotch-brite
3. Inspect the whole assembly.
   a. replace the tie-wrap around the center rods
   b. reassemble the cavity using rivets or short machine screws.
Modification to commercial model for HAM use.

JB4048 - HAM DUPLEX 2

Lower freq. pass input

Blank disc or remove loop from loop/connector assembly

Use shorter loops in the 3 cavities

Use longer loop in these 3 cavities

All cable lengths are 12½ inches, for best results use RG58 cable.

Grounded side of loop should be pointed toward cavity center conductor

Shorter loop

Longer loop

CAVITY - DB4015

1.062

1.437

3 EA SHORT LOOP 048017-003

8 EA LONG LOOP 048017-002

Hi freq. side

Loop/connector assembly Full scale drawing

DECIBEL PRODUCTS, INC.
3184 Quebec Street
Dallas, Texas 75247
NOTES:
1. MATERIAL: COLD ROLLED COPPER SHT. 0.031 THK. (009043-006)

SEE -001
SEE -002
SEE -003

0.220
0.470
0.515 

0.010
-0.000

0.125
0.250

0.78
1.15

0.309

5/16 RAD.

DASH NO. LENGTH

-001
-002
-003

2.500
1.437
1.062

SHT. 0.031

3 X
3 X

\text{HAML LOPES}

3 X 

\text{Make Loops} \quad \text{free each}

TOLERANCES

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES

FINISH: MACHINIST

MAX.: 1/32
MIN.: 1/64

TITLE LOOP COUPLING

5" ALUM. CAVITIES

DRAWN MM.
DATE 6/12/69

CHA.
R.C.T.
DATE 3/11/69

DESIGN
DATE

MFG.
DATE

RELEASED F.J.S.
DATE 3/12/69

SEE NOTE 1

DECIBEL PROD.

REV.

048023

DO NOT SCALE

NEXT ASSEMBLY

REMOVE ALL BURRS AND SHARP EDGES PART SHALL CONFORM TO CAI STANDARD PRACTICES

A 048017 -001

003

H

REV.

OF 1
NOTES:
1. FOR PROPER CABLE TRimming AND CONNECTOR ASSEMBLY REFER TO CONNECTOR ASSEMBLY INST.
   0910001-000.
2. DO NOT REMOVE EXCESSIVE JACKET MATERIAL AND EXPOSE SHIELD BRIDING.
IMPORTANT: TO MAINTAIN MAXIMUM ISOLATION USE DOUBLE SHIELDED OR SOLID OUTER CONDUCTOR COAXIAL CABLE FROM THE DUPLEXER TO THE TX AND RX CHASSIS.

GENERAL

Model DB-4048 duplexer is designed for use with duplex stations or repeaters operating with close frequency spacing in the 166 – 174 MHz band. This model is primarily designed to provide minimum insertion loss and maximum isolation when used in systems having a frequency separation of 500 KHz – 2 MHz but can be used beyond these limits. Under certain conditions, it is also suitable for multiplexing two transmitters, two receivers or two push-to-talk stations into a common antenna.

FIELD TUNING

The duplexer is factory-tuned to the exact operating frequencies and shipped ready for immediate installation. No further field tuning or adjustment is required. If it becomes necessary to change the operating frequencies of the duplexer it may be returned to the factory for returning or may be field tuned if the following equipment is available:

1. A signal generator (50 ohms) capable of producing a signal at the transmitter and receiver frequencies.
2. A receiver tuned to the desired lower frequency signal.
3. A receiver tuned to the desired higher frequency signal.
4. Two 50 ohm pads.

FIELD TUNING PROCEDURE

1. Connect equipment as shown in Figure 1.

   Note: If receivers are not 50 ohms place 50 ohm pads as shown.

   ![Figure 1](attachment:image.png)

   **NOTE:** Lo and Hi refer to the pass frequency input, transmitter or receiver, depending upon which is the lower or higher frequency.

DECIBEL PRODUCTS, INC.
2. See Figure 2, for location of low frequency and high frequency cavities in the duplexer.

3. Tune the signal generator to the desired low frequency. Tune each high frequency cavity for minimum signal into receiver #1. (Clockwise on tuning screw decreases resonant frequency of cavity.)

4. Lock tuning screw shaft nut after tuning each cavity.

5. Tune the signal generator to the desired high frequency. Tune each low frequency cavity for minimum signal into receiver #2.

6. To summarize: tune the high frequency cavities to reject the low frequency, and tune the low frequency cavities to reject the high frequency.

NOTE:
1. Cavities 1, 2, and 3 are high frequency cavities.
2. Cavities 4, 5, and 6 are low frequency cavities.

Figure 2. Duplexer Lay Out